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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/051,728	01/15/2002	John J. Williams JR.	51462	8646

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EXAMINER	
MATTIS, JASON E	
ART UNIT	PAPER NUMBER
2616	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/051,728	WILLIAMS ET AL.	
	Examiner	Art Unit	
	JASON E. MATTIS	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12,13,15-22 and 31-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12,13,15-22 and 31-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment filed 12/31/07. Claims 12, 13, 15-22, and 31-42 are currently pending in the application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 12-13, 15-22, and 31-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giacopelli et al. (U.S. Pat. 4,893,304) in view of Heiman (U.S. Pat. 6,735,203 B1).

With respect to claims 12, 19, 33, and 41, Giacopelli et al. discloses a method and apparatus for mapping packets during a current forwarding cycle in a packet switching device **(See the abstract of Giacopelli et al. for reference to a packet switch performing a method to map packets during a switching cycle)**. Giacopelli et al. also discloses for each particular packet of a plurality of packets stored in a recirculation buffer causing the particular packet to be sent over the current particular path in response to determining that the particular packet can be sent over the current

particular path based on a path occupancy of the current particular path **(See column 4 line 29 to column 5 line 54 and Figure 1 of Giacopelli et al. for reference to a group of packets being stored in recirculation loops 30, which together are a recirculation buffer, for reference to determining whether the packet can be sent over a current path to a destination port based on destination information in the packet and based on whether the path to the destination port is already assigned to another packet for the current packet switching cycle for, meaning the determining is based on path occupancy of the current path, and for reference to sending the packet over the path if the packet wins contention for the path)**. Giacopelli et al. further discloses advancing a current particular path to a next path not already mapped for forwarding a packet during the current forwarding cycle **(See column 5 line 55 to column 6 line 24 to repeating the process of assigning packets to paths for each path, meaning after the first path is assigned a packet for the current packet switching cycle, a next path becomes a new current path)**. Giacopelli et al. also discloses after the operation of assigning each particular packet and while there is at least one path remaining not already mapped for forwarding a packet during the current forwarding cycle identifying a next packet of a group of input packets and causing the next input packet to be sent over the current particular path based on a path occupancy if the next input packet can be sent of the current particular path **(See column 4 line 29 to column 5 line 54 and Figure 1 of Giacopelli et al. for reference to a group of packets being stored in input controllers, for reference to identifying a packet from the input controllers and determining whether the input**

packet can be sent over a current path to a destination port based on destination information in the input packet and based on whether the path to the destination port is already assigned to another packet for the current packet switching cycle for, meaning the determining is based on path occupancy of the current path, and for reference to sending the packet over the path if the packet wins contention for the path). Giacopelli et al. further discloses advancing a current particular path to a next path not already mapped for forwarding a packet during the current forwarding cycle **(See column 5 line 55 to column 6 line 24 to repeating the process of assigning packets to paths for each path, meaning after a current path is assigned a packet for the current packet switching cycle, a next path becomes a new current path)**. Giacopelli et al. also discloses that if the input packet cannot be sent of the current path, it is moved into the recirculation buffer **(See column 5 lines 31-54 and Figure 1 of Giacopelli et al. for reference to if all the current paths available to a destination for a packet have already been assigned to other packets, moving the packet that loses the contention for the paths into the recirculation loops)**. Giacopelli et al. does not disclose logic or one or more computer-readable media containing computer-executable instruction for performing the method. Giacopelli et al. also does not disclose generating a random index identifying a current particular path of a plurality of paths in the packet switching device.

With respect to claim 20, Giacopelli et al. discloses an apparatus for forwarding information over a plurality of paths **(See the abstract of Giacopelli et al. for reference to a packet switch forwarding packets over paths)**. Giacopelli et al. also

discloses a recirculation buffer to store a first set of packets and an input to receive a second set of packets **(See column 4 lines 29-42 and Figure 1 of Giacopelli et al. for reference to storing a first set of packets in recirculation loops, which are a recirculation buffer, and for reference to inputs receiving a second set of packets through input port controllers)**. Giacopelli et al. further discloses control logic configured to attempt to forward packets over the paths each packet time from the first and second sets of packets with preference given to packets in the first set and with the possible path being chosen based on the number of packets previously assigned to the paths during the current packet time wherein a packet remains or is added to the recirculation buffer if not sent over a possible path during a current packet **time (See column 4 line 29 to column 5 line 54 and Figure 1 of Giacopelli et al. for reference to using control logic to attempt to forward packets from both the recirculation loops and the inputs to possible paths with paths being chosen based on a number of packets previously assigned for the path in the current forwarding cycle wherein packets are added to the recirculation loops if it is not possible to send them over a path to the proper destination during the current forwarding cycle)**. Giacopelli et al. does not disclose a random index generator to generate a random index. Giacopelli et al. also does not disclose that a possible particular path is determined based on the random index.

With respect to claim 34, Giacopelli et al. discloses an apparatus for mapping packets during a current forwarding cycle in a packet switching device **(See the abstract of Giacopelli et al. for reference to a packet switch performing a method**

to map packets during a switching cycle). Giacopelli et al. also discloses a plurality of paths and a recirculation buffer **(See column 4 lines 12-42 and Figure 1 of Giacopelli et al. for reference to routing packets among a plurality of paths and for reference to storing a first set of packets in recirculation loops, which are a recirculation buffer, and for reference to inputs receiving a second set of packets through input port controllers)**. Giacopelli et al. also discloses for each particular packet of a plurality of packets stored in a recirculation buffer causing the particular packet to be sent over the current particular path in response to determining that the particular packet can be sent over the current particular path based on a path occupancy of the current particular path **(See column 4 line 29 to column 5 line 54 and Figure 1 of Giacopelli et al. for reference to a group of packets being stored in recirculation loops 30, which together are a recirculation buffer, for reference to determining whether the packet can be sent over a current path to a destination port based on destination information in the packet and based on whether the path to the destination port is already assigned to another packet for the current packet switching cycle for, meaning the determining is based on path occupancy of the current path, and for reference to sending the packet over the path if the packet wins contention for the path)**. Giacopelli et al. further discloses advancing a current particular path to a next path not already mapped for forwarding a packet during the current forwarding cycle **(See column 5 line 55 to column 6 line 24 to repeating the process of assigning packets to paths for each path, meaning after the first path is assigned a packet for the current packet switching cycle, a**

next path becomes a new current path). Giacopelli et al. also discloses after the operation of assigning each particular packet and while there is at least one path remaining not already mapped for forwarding a packet during the current forwarding cycle identifying a next packet of a group of input packets and causing the next input packet to be sent over the current particular path based on a path occupancy if the next input packet can be sent of the current particular path **(See column 4 line 29 to column 5 line 54 and Figure 1 of Giacopelli et al. for reference to a group of packets being stored in input controllers, for reference to identifying a packet from the input controllers and determining whether the input packet can be sent over a current path to a destination port based on destination information in the input packet and based on whether the path to the destination port is already assigned to another packet for the current packet switching cycle for, meaning the determining is based on path occupancy of the current path, and for reference to sending the packet over the path if the packet wins contention for the path)**. Giacopelli et al. further discloses advancing a current particular path to a next path not already mapped for forwarding a packet during the current forwarding cycle **(See column 5 line 55 to column 6 line 24 to repeating the process of assigning packets to paths for each path, meaning after a current path is assigned a packet for the current packet switching cycle, a next path becomes a new current path)**. Giacopelli et al. also discloses that if the input packet cannot be sent of the current path, it is moved into the recirculation buffer **(See column 5 lines 31-54 and Figure 1 of Giacopelli et al. for reference to if all the current paths**

available to a destination for a packet have already been assigned to other packets, moving the packet that loses the contention for the paths into the recirculation loops). Giacopelli et al. does not disclose generating a random index identifying a current particular path of a plurality of paths in the packet switching device.

With respect to claims 12, 19, 20, 33, 34, and 41, Heiman, in the field of communications, discloses that a particular current path is chosen by generating a random index to choose a path to be the particular current path **(See column 5 lines 31-49 of Heiman for reference choosing between multiple paths using a random operation, meaning a random number is generated to randomly choose between multiple paths)**. Choosing a particular current path by generating a random index has the advantage of allowing packets to be distributed more evenly across multiple paths to the same destination in a switching element **(See column 5 lines 35-37 of Heiman for reference to this advantage)**.

It would have been obvious for one of ordinary skill in the art at the time of the invention, when presented with the work of Heiman, to combine choosing a particular current path by generating a random index, as suggested by Heiman, with the system and method of Giacopelli et al., with the motivation being to allow packets to be distributed more evenly across multiple paths to the same destination in a switching element.

With respect to claims 19 and 41, although Giacopelli et al. does not specifically disclose using logic and a computer-readable media tangibly embodying instructions to perform the packet mapping method, using logic and a computer-

readable media tangibly embodying instructions to perform a packet mapping method is old and well known in the art of communications. It would have been obvious for one of ordinary skill in the art at the time of the invention, to combine using logic and a computer-readable media tangibly embodying instructions to perform a packet mapping method with the system and method of Giacopelli et al., with the motivation being to use cheap and widely available processing components to implement the packet mapping method.

With respect to claims 13, 15, 35, and 36, Giacopelli et al. discloses that the current forwarding cycle corresponds to a packet time corresponding to a round of sending one packet over each of the paths **(See column 9 line 66 to column 10 line 40 of Giacopelli et al. for reference to the packets being dynamically allocated in a forwarding cycle corresponding to a packet time slot, which is a round of sending packets over each path)**.

With respect to claims 16 and 37, Giacopelli et al. discloses that each of the paths correspond to a different physical plane of a packet switching system **(See Figures 1A-B of Giacopelli et al. for reference to each path being a different path, or plane, though a switch to a destination port)**.

With respect to claims 17, 18, 38, and 39, Giacopelli et al. disclose that the plurality of path either include all the planes of the switching system or does not include all the plane of the switching system **(Giacopelli et al. inherently discloses that the plurality of paths assigned to transmit a data packet during a forwarding cycle would include all the planes of a switching system if a packet exists to be**

transmitted over each plane during the forwarding cycle and that the plurality of paths assigned to transmit a data packet during a forwarding cycle would not include all the planes of a switching system if a packet does not exist to be transmitted over each plane during the forwarding cycle).

With respect to claims 21 and 22, Giacopelli et al. discloses that a packet is not sent during the current packet time if a destination of the packet is not reachable according to a data structure containing an indication of whether or not the destination is reachable **(See column 5 lines 31-54 and Figure 1 of Giacopelli et al. for reference to if all the current paths available to a destination for a packet have already been assigned to other packets, as determined based on a data structure storing an indication that the possible paths are already assigned, moving the packet that loses the contention for the paths into the recirculation loops, meaning the packet is not sent during the current packet time)**.

With respect to claims 31, 32, 40, and 42, Giacopelli et al. discloses that if a packet is not determined that it can not be sent over the current part it is moved to the end of the recirculation buffer **(See column 5 lines 31-54 and Figure 1 of Giacopelli et al. for reference to moving packets to the recirculation loops, which are shift registers, meaning they are moved to the end of the shift register, if the packet can not be sent over the current path)**.

Response to Arguments

4. The typo from the previous Office Action in which the wrong patent was referenced in the 103 reasoning has been corrected in this Office Action. Due to the typo of the previous Office Action, this Action is made non-final.

5. Applicant's arguments filed 12/31/07 have been fully considered but they are not persuasive.

Regarding Applicant's argument that the suggested modification of Giacopelli et al. with the teachings of Heiman will render Giacopelli et al. unfit for its intended purpose of properly switching packets, the Examiner respectfully disagrees. Applicant argues that there is no capability to deviate from which input of Batcher Network 12 a packet will be presented; however, this argument is moot, since it is the path through a selected banyan network 14a or 14b to an output port which must be selected. Applicant further argues that it makes no sense for a selection capability to be included within switch of Giacopelli et al. since the packets are sorted into ascending or descending order with packets being communicated in the sorted order to the Banyan Network. Again, this argument is moot, since it is not the packets that are randomly selected in the claimed invention, but rather the paths. Giacopelli et al. discloses that the use of multiple banyan networks provides multiple paths for a packet to be routed to a particular output port during a packet switching cycle (See column 6 lines 16-24 of Giacopelli et al. for reference to providing k banyan routing networks 14 allowing k packets to be routed through the different network paths during a packet switching cycle). Giacopelli et al. also discloses selecting packets to be sent through the multiple

banyan networks 14 during a switching cycle (See column 7 lines 3-20 of Giacopelli et al. for reference to selecting two packets addressed to the same output port to be routed using separate paths on separate banyan networks). Therefore, another situation will arise when there is only one packet to be sent to a specific output port during a packet switching cycle. Since there are multiple paths through the different banyan networks to the specific output port, one of these paths must selected for the single packet to use. Heiman discloses that it is advantageous to randomly select among multiple possible paths to outputs. Thus, since Giacopelli et al. discloses the use of multiple different paths to a signal output, it would have been obvious to use the random selection method taught by Heiman to select a path from among the multiple paths. The use of randomly selecting among multiple different paths to the same output does not render the switch of Giacopelli et al. unfit for its intended purposes, since even though the packets are sorted by Giacopelli et al. the particular path used by a packet must still be selected from among multiple available paths.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON E. MATTIS whose telephone number is (571)272-3154. The examiner can normally be reached on M-F 8AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason E Mattis
Examiner
Art Unit 2616

jem
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